Studying the effect of AI Code Generators on Supporting Novice Learners in Introductory Programming

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Abstract

AI code generators like OpenAI Codex have the potential to assist novice programmers by generating code from natural language descriptions, however, over-reliance might negatively impact learning and retention. To explore the implications that AI code generators have on introductory programming, we conducted a controlled experiment with 69 novices (ages 10-17). Learners worked on 45 Python code-authoring tasks, for which half of the learners had access to Codex, each followed by a code-modification task. Our results show that using Codex significantly increased code-authoring performance (1.15x increased completion rate and 1.8x higher scores) while not decreasing performance on manual code-modification tasks. Additionally, learners with access to Codex during the training phase performed slightly better on the evaluation post-tests conducted one week later, although this difference did not reach statistical significance. Of interest, learners with higher Scratch pre-test scores performed significantly better on retention post-tests, if they had prior access to Codex.